LANDSCAPE
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Swift parrot monitoring data analysis for 2023/24 breeding season

Client: Department of Natural Resources and Environment Tasmania
Prepared by: Dr Matt Webb

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Contents

Disclaimer:

This report provides an analysis of the flowering intensity and modelling of occupancy probablities and population trends only. It does not represent a comprehensive population analysis.

Executive Summary

This report provides an overview of results of flowering conditions and the modelled occupancy component of the swift parrot population monitoring program that was funded by Department of Natural Resources and Environment Tasmania (NRE Tas) for the 2023/24 breeding season.

The swift parrot population was concentrated in the southern forests, Bruny Island, Maria Island and southern Channel area where flowering was most abundant. Smaller numbers of birds were recorded around Wielangta, Woodsdale and the Eastern Tiers.

These data will be incorporated into a long-term analysis of breeding success and population trends for the species. The long-term analyses does not form part of this report and will be published separately.

1 Introduction

This report provides an overview of components of the 2023/24 swift parrot breeding season. The 2023/24 breeding season was the 15th consecutive year of the swift parrot population monitoring program. Standardized surveys were undertaken at over 1000 sites in potential swift parrot foraging habitat across their breeding range during October and early November 2023.

Data presented in this report will be incorporated into a long-term analysis of spatiotemporal variation in the distribution of the swift parrots during the breeding season and ongoing monitoring of the species population trend.

The current swift parrot population monitoring program was established in 2009 as part of a joint project between the Australian and Tasmanian Governments.

2 Methodology

2.1 Field Surveys

Field surveys – *as per published articles in peer-reviewed scientific journals*

Presence/absence and abundance of swift parrots was recorded at 1003 survey sites in potential foraging habitat during the early breeding season (i.e. October) allowing their annual breeding distribution to be measured (Webb et al. 2017). To account for detectability, repeated 5-minute site visits (2-5 visits per site per year) were conducted across the monitoring sites.

Flowering of food trees was recorded during bird surveys to provide a measure of food abundance. Flowering was scored on a scale of 0 to 4, where 0= no flower, 1= light, 2=

moderate, 3= heavy and 4= very heavy. Further details of the sampling approach are provided in Webb et al. (2014).

2.2 Data Analysis

Occupancy models are now one of the most commonly utilised approaches to model a species' distribution when presence and absence data are available. These models provide predictions of the probability of a site being occupied in each year. These zero-inflated binomial occupancy models (see Webb et al. 2014 and 2017) use swift parrot presence-absence data as the response variable and account for imperfect detection, food availability and spatial autocorrelation through the inclusion of a spatially explicit covariate. Models were implemented in a Generalized Additive Model (GAM) framework in R-package mgcv (Wood 2004) utilising the EM Algorithm (Webb et al. 2014), as opposed to a traditional generalised linear model structure. This approach allows space to be viewed as continuous (using a bivariate spatial term) with the advantage of simple model selection procedures (Webb et al. 2014).

3 Results and Discussion

Flowering conditions were generally poor across much of the breeding range. At the landscape/regional scale the most abundant flowering of food tree species observed in the breeding range was in the south of Tasmania, primarily in *E. globulus* in the southeast. This included the Channel area, Bruny Island, Maria Island, and from Huonville to Southport Lagoon (Figure 1). Flowering was patchy within these regions, resulting in localised areas of abundant flowering as well as dispersed 'low density' flowering over larger spatial scales. Flowering phenology again followed a general trend of extending into higher altitudes later in the season.

Like previous years, the distribution of the swift parrot population mirrored the distribution of blue gum, black gum and Brookers gum flowering. The population level monitoring program revealed most of the swift parrot population was concentrated in the southern forests, Bruny Island and Maria Island (Figure 2), where flowering was most abundant relative to the remainder of the breeding range.

Within these regions swift parrots were generally concentrated in areas where flowering was most abundant and extended into forested areas, including in the Southern Forests (south of Geeveston), South Bruny Island, the southern Channel area and Maria Island. Smaller numbers of swift parrots were recorded in areas of localised and/or light flowering in the Denison, Barnback and Franklin Forest Blocks (Southern Forests north of Geeveston), Tooms Lake and Lake Leake (Eastern Tiers), Wielangta and the Tasman Peninsula.

Swift parrot occurrences elsewhere in the breeding range were generally associated with flowering restricted to more agricultural and urban landscapes, including Hobart, Orford, Little Swanport and Binalong Bay.

While the population was aggregated in the south where flowering was more abundant in comparison to the rest of the breeding range, flowering was very patchy. Blue gum flowering in the southern forests was generally light with patchy occurrences of heavier flowering, *E. ovata* flowering was rare. The spatial configuration and timing of blue gum flowering strongly influenced the availability of nesting habitat in the region.

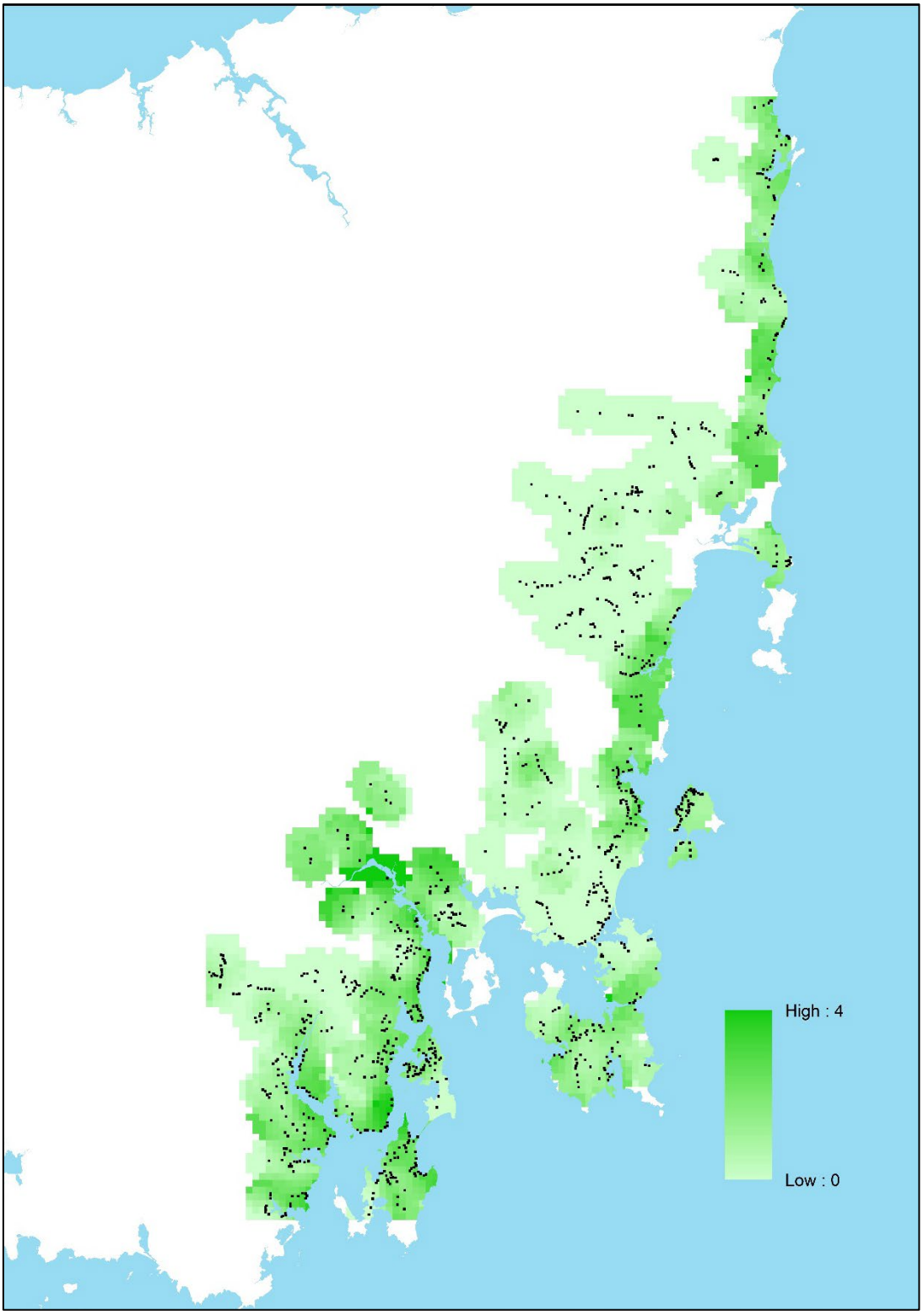

Figure 1: 2023 – Interpolated flowering conditions. Green shading grades from 0 to 4 in flowering intensity. Black dots indicate monitoring sites.

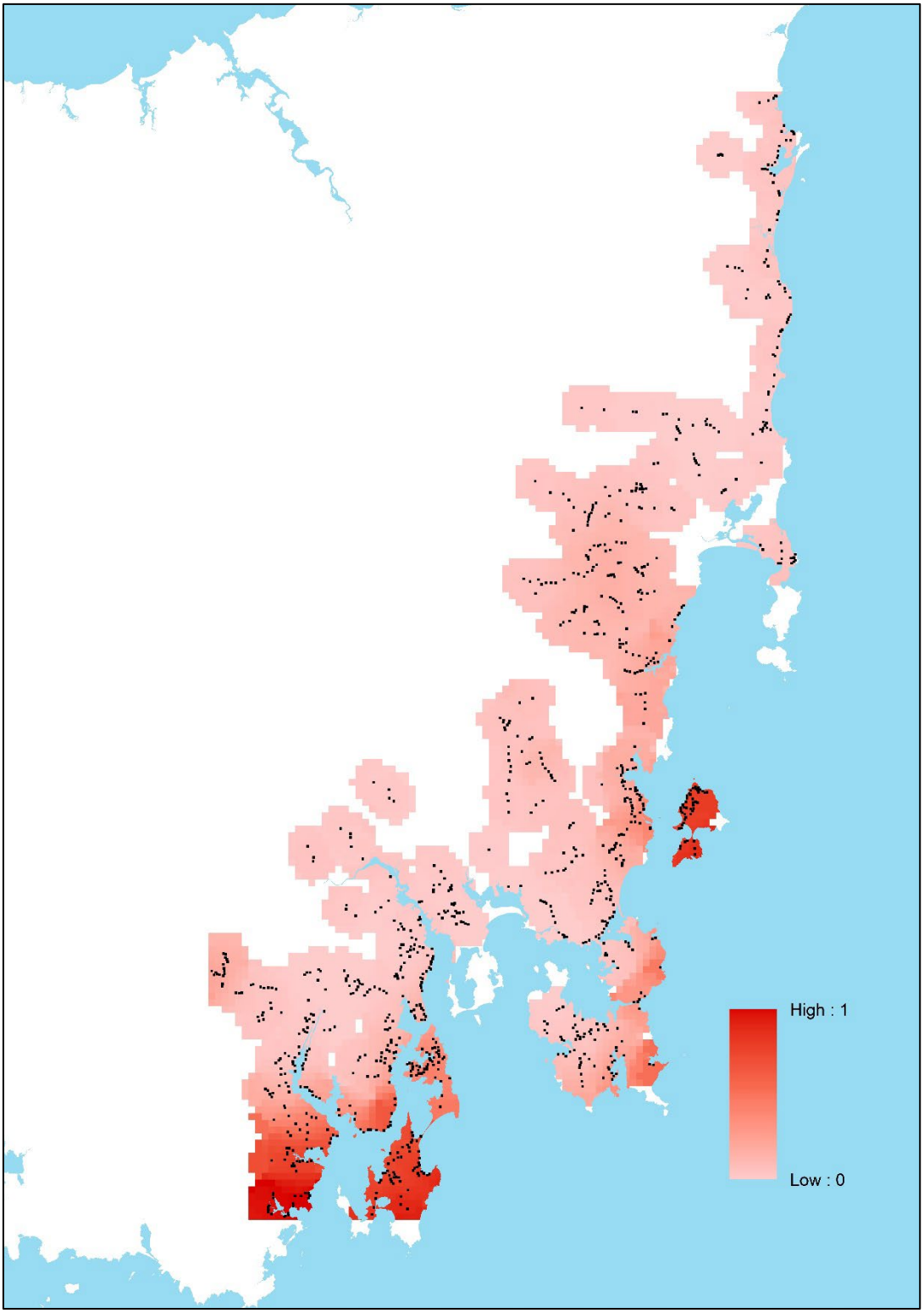

Figure 2: 2023 - Modelled Occupancy Probabilities. Red shading grades from 0 to 1 in occupancy probability. Black dots indicate monitoring sites.

Spatial Trends

The 2023/24 breeding season results reflect the patterns observed in previous years. The limited availability of breeding habitat in 2023/24 highlights the need for conservation planning that incorporates the spatial configuration and relative availability of key resources required for breeding (i.e. food and nesting sites) (Webb et al. 2017). Food (i.e. flowering) is the primary driver of spatiotemporal variation in the species' breeding distribution, which in turn has consequences for the area of available nesting habitat and the density of individuals in any given year.

A similar overall spatial distribution has been documented in previous years (e.g. 2012/13, 2015/16, 2016/17, 2019/20 and 2021/22) when the population has been predominantly concentrated in the south of the breeding range. Relative to flowering conditions across the breeding range the Southern Forests, South Bruny Island and Maria Island provided a higher abundance of food resources. However, flowering conditions were relatively poor in comparison to previous breeding seasons when mast flowering events have occurred in these regions.

The greatest observed abundances of swift parrots in nesting habitat within these regions have been on Bruny Island and in the Kermandie, Hopetoun, Southport and Esperance State Forest Blocks. In the Eastern Tiers the greatest observed abundances were in the Snow Hill and Tooms Lake State Forest Blocks.

Population Trend

Model predictions and flowering conditions were interpolated across the study area using kriging at a 2.25 km^2 resolution (i.e. 1.5 x 1.5 km) with a neighbourhood search radius of 5 km (as per Webb et al. 2014). Interpolations were implemented in ArcMap 10.8.2

The overall proportion of monitoring sites occupied by swift parrots was 0.125 (across 1003 sites). Local mean abundance (LMA) at occupied sites was 3.9 birds. The 2023/24 breeding season results do not indicate a continuing steep decline in population size (Figures 3 and 4). The slight increase in bird numbers over the past two years reflects the variability inherent in the dynamic system the swift parrot relies upon. However, in the context of 15 years of swift parrot population monitoring data a long-term decline in the population size remains evident (see Webb, M. H., Kelman, J. and Welling, A. 2024 for further context).

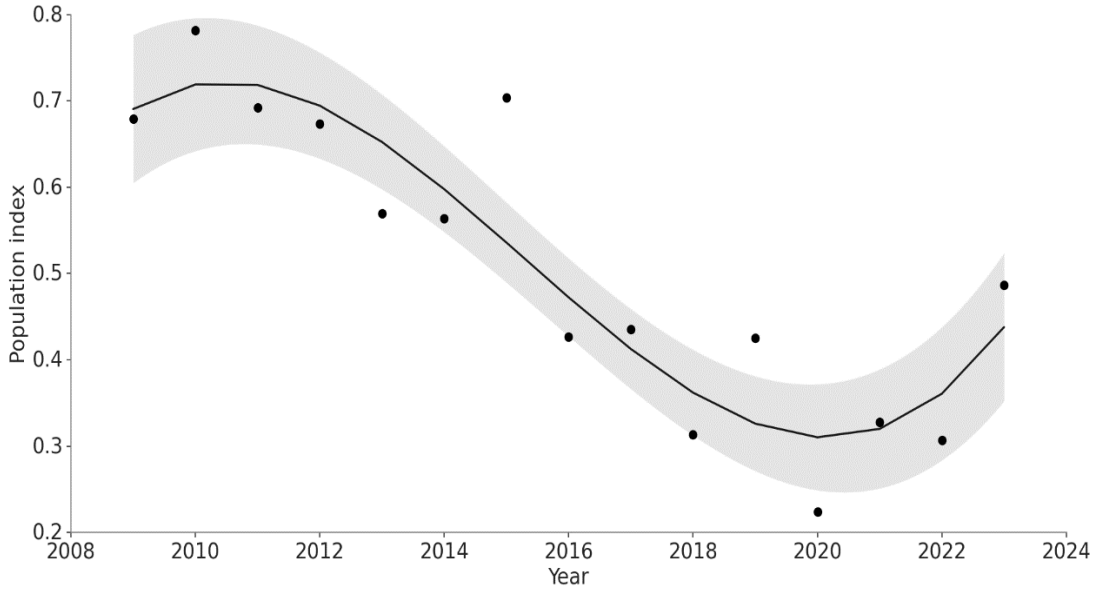

Figure 3. Swift Parrot Population Index derived by multiplying the proportion of occupied sites by local mean abundance for each year (95% Confidence Limits shown in grey).

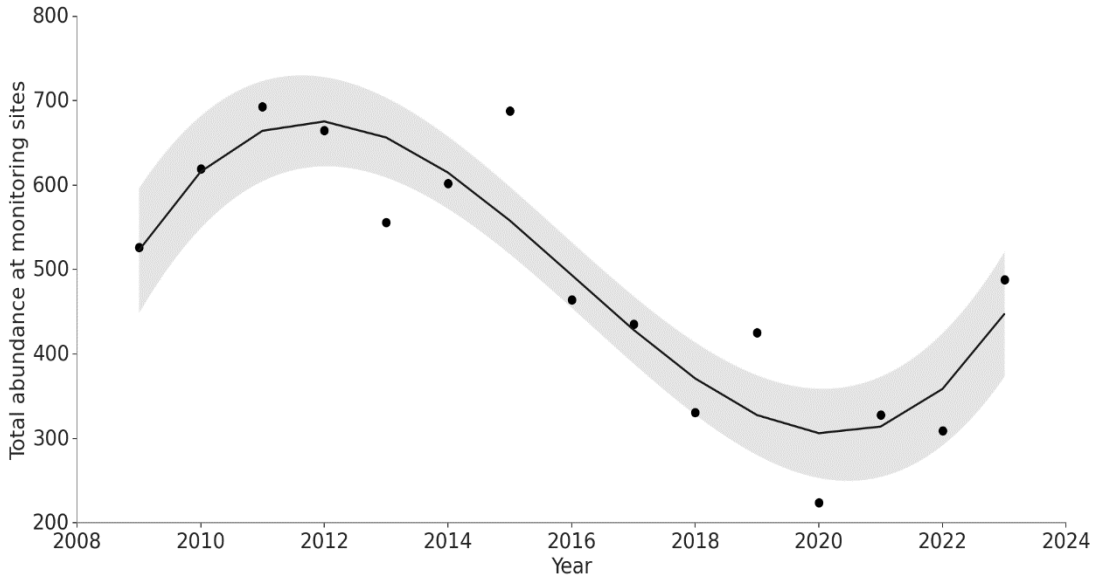

Figure 4. Summed abundance of the maximum count of swift parrots across all monitoring sites (95% Confidence Limits shown in grey).

References

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